

ENVIRON

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RE: New York City Asbestos Litigation
Christian Holinka
Index No. 114120-06

Dear Sirs and Madams:

Thank you for the opportunity to review this matter and conduct an industrial hygiene assessment of the potential asbestos exposures in this case. It is my understanding that the Plaintiff in this matter, Dr. Christian Holinka, claims that his mesothelioma is the result of exposure to laboratory materials that he associates with having contained asbestos and which he handled over the course of his academic and professional career. I have been retained by Defendants ManorCare Health Services, Inc. (alleged to be a successor in interest to Central Scientific Company, a division of Cenco, Inc.) ("ManorCare"), Fisher Scientific International Inc. ("Fisher"), Baxter Healthcare Corporation (alleged to be a successor in interest to American Hospital Supply Corp. and American Scientific Products) ("Baxter"), VWR International, Inc. ("VWR") and Univar USA Inc. ("Univar") (collectively, the "Lab Supply Defendants") to render opinions related to potential asbestos exposures, if any, that might have arisen during the activities that Dr. Holinka undertook related to the use of certain

Lab Supply Defendants

-2-

July 18, 2007

laboratory materials, specifically mittens and Bunsen burner pads, and to assess the possibility that there may have been alternative exposures that might explain the development of his mesothelioma.

In the preparation of this report, I have reviewed the following documents supplied to me in this matter or in related matters that have relevance to this case:

Document Provided	Description	Date
Moline Report	Dr. Jacqueline Moline expert report	03/08/2007
Answers to Interrog	Letter of Application (complaint) and Plaintiff's Answers to Interrogatories	10/03/2006
Social Security Records	Social Security Records	Various
Holinka Depo I	Deposition under oral examination of Christian Holinka	02/12/2007
Holinka Depo II	Deposition under oral examination of Christian Holinka (Volume II)	02/22/2007
Holinka Depo III	Deposition under oral examination of Christian Holinka (Volume III)	03/01/2007
Plaintiff's Expert Report	Dr. James Strauchen, MD expert report Expert for the Plaintiff Pathologist	04/30/2007
Holinka CV	Curriculum Vitae of Christian Holinka	06/22/2006
Medical Records - Dr. Meyers	Medical Records from Dr. Robert Meyers	11/21/2006
Medical Records - NY Presbyterian Hospital	Medical Records from New York Presbyterian Hospital	
Medical Records - Dr. Taub	Medical Records from Dr. Robert Taub at the Herbert Irving Cancer Center	
Medical Records - Radiology	Medical Records from Columbia Presbyterian Eastside Radiology	02/01/2007
SSN Records	Social Security Records	
Workplace simulation report - Dr. Longo	The use of asbestos containing gloves: a work practice study (supplied in the matter of Thames v. Fisher Scientific)	08/2001

These documents provided information on the plaintiff's activities in academic, part-time employment, and full time employment settings. This report is intended to render an opinion on the sources of exposure to asbestos containing materials (ACM) and what contribution, if any, materials provided by the Lab Supply Defendants would have had on that exposure.

Qualifications

I am a nationally certified safety professional and certified industrial hygienist with more than 26 years experience as a safety and health professional. I have been involved in the assessment of asbestos exposures in numerous industries, including laboratories. I have had first hand experience with the laboratory products described in this case through my own academic training. During my time as the Director of Environmental Health and Safety for the New York City Department of Design and Construction, a public works agency

Expert Report of Robert C. Adams

ENVIRON

Lab Supply Defendants

-3-

July 18, 2007

responsible for the construction and renovation of the majority of New York City's publicly owned buildings and infrastructure, I was involved in work in several city-owned laboratory facilities. I have conducted industrial hygiene studies of many different industrial workplaces, including laboratories and educational facilities. I have conducted a number of air sampling studies for the presence of asbestos in many different types of buildings. I carry United States Environmental Protection Agency (USEPA) and New York State Certificates as an Asbestos Building Inspector and Asbestos Project Designer and am intimately familiar with the uses of ACM in buildings, laboratory products and in other applications. I am a Fellow of the American Industrial Hygiene Association, a Professional Member of the American Society of Safety Engineers and a Diplomat of the American Academy of Industrial Hygiene. I am an adjunct professor at the Master's level teaching courses in industrial hygiene at St. Joseph's University in Philadelphia. My Curriculum Vitae is attached.

My opinions in this matter are stated within a reasonable degree of professional and scientific certainty.

Overview of Life and Work History

Dr. Holinka was born on July 7, 1937 in Germany and was a lifelong non-smoker. He immigrated to the United States in 1956 and worked briefly as an elevator operator before enlisting in the U.S. Army in that same year. After completing basic training, Dr. Holinka was stationed at Fort Sam where he was trained as a medical laboratory technician. From 1957 to 1959, Dr. Holinka worked in a medical laboratory while stationed at the 98 General Hospital. Dr. Holinka left military service in 1959 and worked for Booth Memorial Hospital for three to five months before enrolling as a student at the University of California at Berkeley. While an undergraduate, Dr. Holinka also worked part time in a research laboratory. Dr. Holinka then enrolled as a graduate student in biology at Hunter College, but transferred to medical school at McGill University after two semesters. In 1964, Dr. Holinka withdrew from medical school and started working full time for the same laboratory he had worked while an undergraduate. That same year, Dr. Holinka enrolled as a graduate student in physiology at UC Berkeley. After completing his Master of Science in physiology, Dr. Holinka enrolled as a graduate student in comparative literature and continued taking classes and working as a teaching assistant until 1971. In 1971, Dr. Holinka enrolled as a graduate student in biological sciences at the State University of New York at Stony Brook (SUNY Stony Brook). He was awarded his doctorate in 1974 and worked as a post-doctoral fellow from 1974 to 1977. Following his post-doctoral fellowship, Dr. Holinka worked as a research instructor and professor until 1989 at Mt. Sinai Hospital. From 1989 to 1996, Dr. Holinka was employed in the pharmaceutical industry with various companies. Since 1996, he has continued working with the pharmaceutical industry as an independent consultant.

In August of 2006, Dr. Holinka was diagnosed with malignant pleural mesothelioma.

Overview of industrial hygiene assessment of this case

In reviewing the information in this case, I have assessed the peer reviewed literature relative to the potential levels of exposure that would be associated with the use of the laboratory materials that Dr. Holinka alleges to have handled in the course of his academic studies, part time and full time employment, post graduate research, and faculty research. He claims that

Lab Supply Defendants

-4-

July 18, 2007

his asbestos exposure occurred throughout his academic and occupational career. From his deposition testimony, I have assessed the exposure factors (time, frequency of use, duration of exposure and opportunities for exposure) that might have led to asbestos exposure. Based on this information, I calculated a reasonable maximum estimate of his potential average daily and lifetime cumulative exposures from the use of certain products that Dr. Holinka allegedly handled, including mittens and Bunsen burner pads, and that he alleges contained asbestos. I compared the reasonable maximum estimates to available data on cumulative exposure studies associated with the development of mesothelioma. I also compared this to cumulative levels that are associated with lifetime exposures to asbestos in the ambient environment as well as the level that a worker exposed at the current Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) would have over a working lifetime.

The industrial hygiene approach

As defined by the American Industrial Hygiene Association (AIHA), industrial hygiene (IH) is "the science and art devoted to the anticipation, recognition, evaluation, and control of those environmental factors or stresses arising in or from the workplace which may cause sickness, impaired health and well being, or significant discomfort among workers or among citizens of the community" (<http://www.aiha.org/Content/AboutAIHA/whatisIH.htm>). The anticipation and recognition functions of industrial hygienists are supported by reviews of the relevant scientific literature and by familiarity with various workplaces and work practices. The evaluation function is supported by visual inspections of work places and practices, knowledge of the processes, the sources of emission, and by objective measurements of the agent of concern. Such objective measurements can be obtained from peer-reviewed studies of the specific tasks or studies of analogous tasks that have similar exposure conditions or through contemporary field measurements or workplace simulations. A critical aspect of the industrial hygiene approach is identifying and implementing measurement techniques and analysis methods appropriate to the type of compound of interest and considering the potential interferences that can arise from the work environment.

When properly performed, the results of the workplace measurements can be compared to regulatory standards, such as the OSHA PEL, or consensus non-regulatory guidelines, such as the American Conference of Governmental Industrial Hygienists Threshold Limit Values. However, the assessment process is not limited to the comparison of results to standards or guidelines. The appropriate interpretation of exposure measurements includes an assessment of the magnitude of human health risks experienced by individuals with exposures at various levels and for different amounts of time. This assessment includes calculating a likely range of exposures experienced by individuals under different circumstances, and comparing those exposure estimates to exposure levels that have been associated with health risks as described in the literature.

If the potential for an unacceptable level of exposure is identified in the course of an evaluation, IH practitioners also possess the training and expertise to recommend appropriate and practical methods to reduce or eliminate exposure through engineering, environmental, or administrative controls, or the use of personal protective equipment.

Lab Supply Defendants

-5-

July 18, 2007

Exposure estimation using IH data

From the IH perspective, the assessment of an individual's asbestos exposure is evaluated based on the following factors:

- exposure magnitude (concentration in the air);
- exposure intensity (hours of exposure each day or week); and
- exposure duration (number of years of exposure).

With respect to asbestos-related diseases, it is also essential to account for fiber type and fiber size in order to characterize health risks appropriately.

Exposure magnitude, intensity and duration

Industrial hygienists typically summarize exposure with measures that integrate magnitude, intensity and duration of exposure. The magnitude of exposure to asbestos is generally measured in units of fibers per cubic centimeter of air (f/cc). When multiplied by the intensity of exposure, the result is the daily average or time-weighted average (TWA). For the assessment of occupational exposures, an 8-hour workday is assumed. Cumulative exposure metrics additionally account for the exposure duration, in years, and are typically expressed as fiber-years/cc or sometimes simply fiber-years. For example, a daily TWA exposure of 0.1 f/cc for 1 year would result in a cumulative exposure of 0.1 fiber-years/cc.

Lifetime cumulative exposure associated with employment is considered to occur over 40 to 45 years (i.e., the expected duration of a person's working life, if employment begins at age 20 and ends at age 60 or 65). The lifetime cumulative asbestos exposure of a worker employed for 40 years at the current OSHA PEL of 0.1 f/cc (OSHA 1994) will be 4 fiber-years/cc. Asbestos-related lung diseases (malignant and nonmalignant) or signs of these diseases have been reported in groups of occupationally exposed humans with cumulative exposures ranging from about 5 to 1,200 fiber-years/cc. Such cumulative exposures would result from 40 years of occupational exposure to concentrations ranging from 0.125 to 30 f/cc. (ATSDR 2001).

Small quantities of asbestos fibers are ubiquitous in air, arising from natural sources, windblown soil from hazardous waste sites, deterioration of automobile clutches and brakes, or breakdown of asbestos-containing materials such as insulation (ATSDR 2001). In some urban environments, the ambient concentration of asbestos has been reported to be as high as 0.001 f/cc (IPCS 1986). For a 70-year lifetime, this would result in a total cumulative exposure of 0.07 fiber-years/cc. Such a cumulative level of exposure is not known to be associated with any increased risk of asbestos related disease.

Fiber type

Chrysotile asbestos is unique in that it has a serpentine fiber-formation (curled fibers) compared to the amphibole fibers, including amosite and crocidolite, which are straight and needle-like. Chrysotile asbestos is less likely to be retained in the lung if inhaled with a short half-life on the order of weeks or months. In contrast, amphibole fibers have a half-life in the lung of 20 to 40 years. Amphiboles are thus considered to be more biologically active than chrysotile (Rasmuson 2004) and have been found to be more strongly and consistently

Lab Supply Defendants

-6-

July 18, 2007

associated with risk of mesothelioma, compared with chrysotile, in persons occupationally exposed to asbestos (Hodgson, 2005).

According to a 1988 review by Churg, although chrysotile asbestos may produce mesothelioma in man, the total number of such cases is small and the required doses are extremely high. Some studies suggest that the cumulative lifetime exposure to chrysotile would need to be in the range of 25 fiber-years/cc to 100 fiber-years/cc (Rasmuson 2004). In the absence of any amphibole exposure, the risk of mesothelioma from exposure to chrysotile fibers alone, especially in low concentrations, is considered insignificant.

Chrysotile is the most common form of asbestos used in the United States, making up nearly 99% of all asbestos products that were produced (NIOSH/OSHA 1980; ATSDR 2001). Vitra (2005) reported that chrysotile accounted for 96% of the world production and consumption of asbestos products from 1900 to 2003. Laboratory products that have been studied, such as asbestos gloves, have been found to contain only chrysotile. It is likely that products like Bunsen burner pads would also be chrysotile containing since the amphiboles tend to be more inflexible and thus are more limited in being fabricated into products (ATSDR 2001). The white color of the center is also a indication that the product is chrysotile containing; chrysotile fibers are white, amosite is yellowish-brown, and crocidolite is a lavender or blue color (Vitra 2005). The amphibole forms, based on information in the literature and my personal experience in the inspection and sampling of buildings for the presence of ACM, are more commonly associated with friable insulation materials, especially steam pipes and boilers. Amosite was commonly used in marine vessels (Harries 1971) and industries with hot processes such as steel mills. Crocidolite was also used in some marine vessels (Harries 1971) and was used in gaskets associated with acid piping in pulp and paper mills (Mangold 2006).

Fiber size

The final determinant of risk for the development of asbestos related diseases is fiber size. Studies have consistently shown that long thin fibers greater than 5 microns in length with an aspect ratio (length to width ratio) equal to or greater than 3:1 present the greatest risk of mesothelioma development (ERG 2003). Particles that do not meet these size parameters are not known to be associated with an increased risk for the development of asbestos related diseases.

Exposure estimation

The first step in the estimation of the exposure that an individual may have received is a careful review of the scientific literature for information on historic exposures associated with the job or task that the person performed. A tool that is used for this purpose is PubMed, provided by the US National Library of Medicine. PubMed is a powerful standard research tool available free over the internet, which can search the scientific literature published since about 1966. Publications available via the NIOSH, OSHA and USEPA websites can also provide valuable historic exposure information. Where there is no specific data available for a particular work task, the industrial hygienist will use estimates from jobs with similar exposure conditions or work practices. In addition, there are also general groupings of exposure values associated with the use and handling of certain types of materials. For example, work involving non-friable asbestos materials have had historic airborne concentrations that range from 0.01 to 0.1 f/cc, with many data in the ambient

Lab Supply Defendants

-7-

July 18, 2007

background range (Rasmuson 2004). If an individual is working with a non-friable material, then the industrial hygienist will assign a value based on the nature of the work that is being performed, selecting the lower end of the range for work that involves limited opportunities for disturbance and selecting the higher end of the range if the work involves tasks with more potential for disturbance. From this information, an exposure value (or range of values) is assigned to each job or task and, with the exposure time factors, is used to provide a reasonable maximum estimate of the daily 8-hour TWA. When multiplied by the duration of exposure, the individual contribution to the cumulative lifetime exposure can be determined for each task or job. The sum of the individual contributions is the total cumulative lifetime exposure for the individual, which can then be compared to information related to the lifetime risk for the development of disease.

Opportunities for Exposure

U.S. Army

Dr. Holinka trained and worked as a laboratory technician in the U.S. Army from 1956 to 1959. During the four and a half to five months of training, Dr. Holinka reportedly spent 5 to 6 hours per day working in a laboratory. The alleged asbestos exposures occurring during training included asbestos Bunsen burner pads and components from incubators; however, no exposures were alleged to have occurred during the first two months (basic training) and during the last two months of his training. Bunsen-burners were used approximately 2-hours per week and the pads were replaced "once they became brittle or somewhat dusty". Dr. Holinka alleges that he used an incubator for bacterial cultures and that the incubator may have contained components manufactured from asbestos. After completing training, Dr. Holinka worked as a laboratory technician in biochemistry, hematology, and pathology at the 98 General Hospital in Germany. While stationed in Germany, Dr. Holinka alleged exposure from asbestos mittens and Bunsen burner pads. The pads were used on a daily basis and changed once per week due to observed wearing of the asbestos pad. Asbestos mittens were also used on a daily basis for short periods, only minutes in many cases. With the exception of wearing a mask while working with bacterial cultures, no respiratory protection was worn while training or working in the laboratory for the U.S. Army.

Academic Coursework and Research

As an undergraduate, Dr. Holinka majored in French literature and had a minor in physiology. He completed his degree requirements and graduated in two and a half years. During the course of his undergraduate education, Dr. Holinka alleges that he used asbestos mittens and Bunsen burner pads in approximately six laboratory courses in chemistry and physiology. The mittens were reportedly used several times a session; a session defined as meeting twice a week for 3 hours over twelve weeks.

From the fall of 1962 to late spring of 1963, Dr. Holinka attended Hunter College in New York. He reported using asbestos burner pads in one course that met for three hours once a week for four months. Dr. Holinka left after two semesters to attend medical school at McGill University in Montreal. He alleged no use of asbestos products while at McGill, which lasted only two semesters.

From August of 1964 to August of 1968, Dr. Holinka was enrolled as a graduate student in physiology at UC Berkeley. He alleges exposure to asbestos mittens and burner pads while

Lab Supply Defendants

-8-

July 18, 2007

performing research for his dissertation but the frequency and duration were not provided. His research was focused on rat brain endocrinology. After completing this degree, Dr. Holinka continued further studies in comparative literature, a program where he had no opportunities for exposure to laboratory equipment.

From 1971 to 1974, Dr. Holinka was enrolled as a graduate student in biological sciences at SUNY Stony Brook. He reported using asbestos mittens and Bunsen burner pads while performing research in the anatomy department for his degree. His research focused on hormonal control of the maternal paramount in rats. Most of the experiments conducted for his research were behavioral experiments. Dr. Holinka alleges that burner pads were used on a daily basis and were replaced no more than once per month. The mittens were reportedly used once every few days and were replaced approximately every four months.

Part Time and Temporary Laboratory Employment

After leaving military service, Dr. Holinka worked for 3-months (40hrs/week) as a laboratory technician at Booth Memorial Hospital. His work included clinical chemistry and analysis of human material serum and urine. Alleged asbestos exposure occurred as a result of his handling of asbestos mittens and Bunsen burner pads. Burner pads were used on a daily basis and were reportedly replaced every few days due to wearing of the pad. Mittens were used on a daily basis to handle hot glassware.

While attending UC Berkeley as an undergraduate, Dr. Holinka worked part-time (12-20 hrs/week) in a research laboratory from the spring of 1960 to summer of 1962. His responsibilities were generally limited to analysis of California soils. He alleges use of asbestos burner pads and mittens. The burner pads were changed once ever two to three weeks. The mittens were reportedly used several times a week to handle hot glassware. Dr. Holinka described using mittens to swirl a flask while heating solutions and to remove glassware from a hot drying oven.

In the winter of 1964, Dr. Holinka left medical school and started working full time (40 hrs/week) in the same laboratory he had worked in as an undergraduate. He remained a full time employee of the laboratory until August of 1964. This time period of employment is not reflected in the social security records that were provided. During this period of time, Dr. Holinka allegedly used asbestos mittens and burner pads. From the end of 1961 until the beginning of 1971, Dr. Holinka did not work for a private employer as evidenced by his social security records.

Dr. Holinka was employed part-time (18 hrs/week) at the Columbia University Presbyterian Medical Center from 1971 to 1974 while pursuing his doctorate in biological sciences at SUNY Stony Brook. While working in this laboratory, Dr. Holinka's primary responsibility was the analysis of human serum plasma. Dr. Holinka alleges that he used asbestos mittens once every two weeks and burner pads on a daily basis.

Post-Doctoral and Faculty Research

From 1974 to 1977, Dr. Holinka worked as a post-doctoral fellow at the University of Southern California. This was primarily a research position; however, five to ten percent of his time was devoted to teaching. His research included animal work and biochemical

Lab Supply Defendants

-9-

July 18, 2007

analysis and he would wear a surgical mask while performing experiments. Dr. Holinka reported using asbestos burner pads and mittens during this period of time.

After completing his post-doctoral fellowship, Dr. Holinka worked as a research instructor and later as a research professor at Mount Sinai from August 1977 to July 1989. He was involved in animal research and biochemical research in women's health care. Asbestos burner pads and mittens were used on a daily basis. Burner pads were replaced once every two months.

After 1989, Dr. Holinka began employment in the pharmaceutical industry with a number of firms and then became an independent consultant to the industry. He did not have any known asbestos exposures during this period of his career.

Summary of Opportunities for Exposure

Dr. Holinka provided limited information on the exact amount of time that he handled the Bunsen burner pads and the mittens that he claimed to use routinely. From his depositions, Dr. Holinka's first alleged asbestos exposure occurred while training and working as a laboratory technician in the U.S. Army from 1956 to 1959. From 1959 to 1963, Dr. Holinka had limited intermittent asbestos exposure while working with asbestos mittens and burner pads in academic and part-time employment laboratories. No alleged asbestos exposure occurred during the two semesters that Dr. Holinka was enrolled in medical school. From 1964 to 1966, Dr. Holinka again had limited intermittent exposure to asbestos mittens and burner pads. No alleged asbestos exposures occurred while he was pursuing a degree in comparative literature from 1966 to 1968 or while taking literature courses from 1968 to 1971. From 1971 to 1989, Dr. Holinka had limited exposure to burner pads and asbestos mittens. No alleged asbestos exposures have occurred since 1989.

In all, based on the very limited information that Dr. Holinka provided, I have estimated that his daily handling of the Bunsen burner pads would have been only about 60 minutes per day, three days per week for 20 years (taking into consideration the fact that he had several years where he did not have any potential exposure, did not work in the laboratory full time for much of this time, and had periods of time where he did not handle the pads on a daily basis). Likewise, his use of mittens for handling hot glassware would also be no more than 60 minutes per day, but the usage was likely only two days per week for 20 years (again considering that he did not use the mittens on a daily basis, did not work full time in the laboratory, and had time periods where he did not perform any lab work).

From his depositions, it was not possible to identify any other sources of asbestos exposure from his academic or professional careers.

Exposure Assessment

Asbestos Mittens

There have been studies of the use of asbestos containing gloves and mittens similar to the products used by Dr. Holinka. One study that has been frequently cited is the 1981 study by Samimi on asbestos exposure from wearing asbestos gloves. As part of the study, Samimi reported concentrations of airborne fibers emitted in five actual workplace laboratories that would have been similar to the laboratory environment in which Dr. Holinka worked. The

Lab Supply Defendants

-10-

July 18, 2007

results ranged from 0.07 f/cc to 2.93 f/cc (mean = 0.83 f/cc; 7 samples). Samimi noted that the gradual soiling of gloves reduces the extent of fiber emissions although prolonged use could result in damage or deterioration. In discussing the range of measurements obtained from the five workplace laboratories, the study authors assert that differences in room size and arrangements, room ventilation system, and amount of moisture on the gloves are factors that influence exposure of workers. Gloves were composed of asbestos cloth containing 80-85% asbestos and 15-20% rayon and were treated with an acrylate-base compound to make them "lint-free." The fiber type was not specified in the study.

One of the major limitations of the study by Samimi is the use of the Phase Contrast Microscopy (PCM) analytical methodology. The PCM method is the most common method for the measurement of asbestos fibers in air and continues to be used extensively today. However, a significant limitation is that it does not distinguish asbestos fibers from other fibers. Although optical counting methods using membrane filters had been employed previously, the standard PCM methodology was not established by the National Institute for Occupational Safety and Health (NIOSH) until 1977. It was superseded by NIOSH Method 7400 around 1984. The approach to determining the level of fibers is defined by fiber counting rules. The fiber counting criteria include the counting of only fibers equal to or longer than 5 microns and the counting of all particles *as asbestos* (emphasis added) that have a length-to-width ratio (aspect ratio) of 3:1 or greater (NIOSH 1994). As stated in the documentation of the method, other airborne fibers (that is, non-asbestos fibers) may interfere, since all particles meeting the counting criteria are counted (NIOSH 1994). Thus the presence of gypsum, cement, silica, mineral wool, fiberglass, cellulose and other natural and man-made particles can, and often are, counted and treated as if they were asbestos. Consequently, an analysis by PCM indicating elevated fiber counts does not necessarily indicate the presence of asbestos nor the true magnitude of the exposure. At best, PCM merely provides an index of exposure to particles present in a given size range and shape, not necessarily that those fibers are asbestos (Baron 2001).

Another major limitation is that no background samples were reported to have been collected in the laboratories where Samimi conducted his measurements prior to the sampling to assess ambient fiber levels. Without controlling for ambient fibers, such as clothing, human hair, fibrous glass, or other fibrous matter, the asbestos exposure levels obtained in the Samimi study most likely overstate the true concentration.

Samimi also conducted testing in isolation chambers, which resulted in concentrations ranging from 0.95 to 11.74 f/cc. The range of results from the isolation chambers, which are substantially greater than the modern OSHA PEL, were most likely due to poor quality assurance methods that were in place at the time of the study and potentially poor housekeeping practices between simulations (Cherrie 2005). I am aware of some modern simulations that were carried out in isolation chambers that had high ambient fiber backgrounds, specifically a study by Dr. William Longo, of gaskets in which the background concentration in one of the simulations exceeded the OSHA PEL (Longo 2002). This type of poor quality control could explain the elevated results that were found during the sampling in the isolation chambers.

In a 2005 study on asbestos exposure from wearing asbestos mittens, Cherrie collected measurements during three separate glass manufacturing tasks. Chrysotile asbestos mittens

Lab Supply Defendants

-11-

July 18, 2007

made in the 1970s were used. This study simulated three test conditions that would involve aggressive handling of materials while wearing mittens, methods that would be more aggressive than would be typical of use in a laboratory. In this study, the authors provided detailed information as to how they controlled for non-asbestos fibers through a process of cleaning and vacuuming the chambers after each simulation.

The tasks were performed both with no ventilation and with high ventilation within a 45 cubic meter enclosure. Laboratories typically have high ventilation rates due to the presence of fume hoods and the handling of chemical and biological agents. Ventilation requirements in the current American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE 2004) for laboratories require 1.0 cubic foot of air volume for every square foot of laboratory space. This requirement is greater than for nearly all other occupancies, except of automobile garages. The presence of fume hoods places additional demand for replacement air that can result in up to 10 air changes per hour in laboratory spaces (DiBerardinis 1993), again a level that is higher than most other occupancies.

The reported mean personal airborne fiber concentration from 33 samples ranged from 0.03 f/cc to 0.48 f/cc. The lowest mean fiber concentrations were obtained when high localized ventilation was used, and the highest mean concentrations were obtained when no ventilation was used. Both new and aged mittens were utilized, and the differences between mean airborne fiber concentrations for aged gloves and new mittens were not statistically significant. Based on observations made during the tests, obvious releases of airborne dust occurred when the mittens were abraded on sharp metal edges. Each simulation was carried out over a 30-minute period, and each task investigated was continuously repeated during that period. Cherie found levels of fiber release from gloves, but ultimately concluded that the levels are not indicative of increased risk. As with the Samimi study, the authors used the PCM method for analysis, which could overstate the levels of fiber in the air. In addition, these results were not weighted for an 8-hour work day.

I have been provided with a workplace simulation conducted by Dr. Longo, provided to me in another matter. While Dr. Longo has used methods that are not consistent with accepted IH practice in other workplace simulations that he has undertaken, such as using Tyndall lighting and indirect preparation of samples for transmission electron microscopy analysis, my review of this simulation found that his methods and interpretation were in general conformance with good IH practice. In this simulation, gloves composed of 75% chrysotile asbestos were used. This simulation involved the repeated handling of bricks, which would result in aggressive and abrasive methods that would not be typical for laboratory use. In the simulation, 12 bricks were moved while wearing the gloves and the activity was repeated once each hour for four hours. The task based concentration results from this simulation were reported to be 0.02 f/cc.

It is my opinion that the data from the Cherie and Longo studies are the best representation of Dr. Holinka's likely exposure from the use of the mittens. Based on the Cherie study and the Longo simulation, it is my opinion that a reasonable maximum task based exposure would be 0.02 f/cc and a reasonable maximum estimate of the TWA exposure for Dr. Holinka, based on the frequency of glove use (which was infrequent, intermittent and irregular), would be 0.001 f/cc. With a daily average in this range for fifteen years, the reasonable maximum contribution to Dr. Holinka's lifetime cumulative exposure from his

Lab Supply Defendants

-12-

July 18, 2007

use of asbestos mittens would be no more than 0.02 fiber-years/cc. The fiber type would have been chrysotile asbestos.

Bunsen Burner Pad

There have been no studies of the potential for the release of asbestos from the use of Bunsen burner pads in the peer-reviewed scientific literature. Bunsen burner pads were composed of iron wire mesh gauze, which came in various sizes and had a thin, small diameter, white circular center that contained asbestos. The white coloration of the center material is an indication that it is chrysotile containing as discussed previously. This thin layer of asbestos was designed to protect the bottom of the glassware from the high heat of a Bunsen burner flame.

While the fiber type and percentage of asbestos content in the pad is not known, it was most likely chrysotile due to the preponderance of chrysotile use in the United States. In addition, the center of the pad would not be friable, that is, not easily crushed or pulverized to powder by hand pressure, and would not release fibers under normal handling due to the binding of the asbestos fibers within a solid matrix. Using the pads as intended would not release fibers readily when used in normal laboratory heating procedures. It would require aggressive actions like sanding, grinding or abrading the center to release fibers, an activity that was not done by Dr. Holinka.

I have had personal first hand experience in the use of these Bunsen burner pads both in my academic experience and as a result of laboratory health and safety audits that I have conducted throughout my career. From my personal experience in a laboratory, the actual time spent handling the pads is minimal, only minutes per day. The pad is placed on a ring stand upon which a flask, beaker, or other type of glassware would be placed. The Bunsen burner would be placed underneath. During the heating of the glassware, there is no opportunity to come into contact with the pad. If running multiple tests, the pad would be left on the ring stand. Once the tests were completed, the pad would typically be stored once it had cooled and could be safely handled.

Dr. Holinka repeatedly stated that he believed that ambient asbestos fibers were likely generated as the heat from the Bunsen burners caused the fibers in the burner pads to become brittle. He could not recall the temperature of the Bunsen burner, nor could he recall the fuel source for the burners. Based on his descriptions, it is my opinion that the flaking and damage of the pads was due to thermal degradation of the asbestos due to the application of high heat.

A Bunsen burner is a gas burner commonly used in laboratories, most typically using natural gas as a fuel source, which can produce a flame capable of reaching temperatures of 1,500° Celsius (°C) or 2,732° Fahrenheit (°F) or higher (Bunsen burner 1998; Flinn 2007). All forms of asbestos are subject to melting and thermal degradation at temperatures beginning at 600 °C. Chrysotile will decompose to forsterite, a member of the olivine mineral family and a material that is not asbestos, starting around 500 °C with conversion to well-crystallized forsterite at temperatures from 800 °C (Jeyaratnam 1994) to 850 °C (ATSDR 2001; Vitra 2002). The amphibole forms also degrade with exposure to high temperatures. Amosite will degrade in to spinel, hematite and cristobalite starting at 600 °C. Crocidolite

Lab Supply Defendants

-13-

July 18, 2007

will degrade into acmite, hematite and cristobalite starting at 800 °C. Heating for as little as 30 minutes at temperatures of 900 °C will result in the breakdown of all asbestos (Jeyaratnam 1994). These degradation reactions are not reversible.

As described by Dr. Holinka, the pads would wear out and he would replace them, sometimes as often as once every few days. Being subjected to frequent high heating with the Bunsen burner, at temperatures that were at or above 900 °C, the degradation reported by Dr. Holinka was reasonably the result of the breakdown of the asbestos fibers in the pad to non-fibrous, non-asbestos forms that are not linked to the development of mesothelioma.

Dr. Holinka's opportunity for exposure to asbestos from the use of the burner pads was irregular, intermittent and very limited. On average, he would have used these pads no more than a few hours per week, in many cases reasonably only minutes per day, with many periods of non-use. While the pads may have worn out frequently and needed to be replaced, this does not mean that he was exposed to asbestos fibers. He did not grind or pulverize the pads and did not take actions that would have readily released the asbestos fibers from the binder material.

The burner pads were not subject to aggressive handling other than the heating. If the use of woven gloves, picking up bricks, as simulated by Dr. Longo, could not create levels of asbestos greater than 0.02 f/cc, there is no possibility that the brief handling of intact burner pads could create levels higher than 0.02 f/cc. Any particulate that would be released from used pads that had been heated repeatedly would not be asbestos, having been degraded by the heat to non-asbestos forms. It is my opinion that, with a task based exposure that would be no greater than 0.02 f/cc for no more than 60 minutes per day for about three days a week, a reasonable maximum estimate of the TWA exposure for Dr. Holinka, based on the frequency of pad use (which was infrequent, intermittent and irregular), would be 0.0015 f/cc as a daily average. The reasonable maximum contribution to Dr. Holinka's lifetime cumulative exposure as a result of his use of the Bunsen burner pads would be no more than 0.03 fiber-years/cc.

Exposure Summary

The total cumulative exposure that Dr. Holinka would have had from the use and handling of the two primary laboratory products identified in his depositions has been reasonably estimated to be no more than 0.05 fiber-years/cc and with a high degree of certainty that the true exposure was in fact lower than this estimate. This level is still less than the cumulative exposure that a person living 70 years in an urban environment would receive from the presence of asbestos that is naturally present in the air. This level is also nearly two orders of magnitude less than the lifetime occupational exposure that a person working in an environment with TWA concentrations at the current OSHA PEL would receive.

Opinion

It is my overall opinion, within a reasonable degree of professional and scientific certainty, that Dr. Holinka's pleural mesothelioma was not the direct result of exposure to any asbestos containing products identified by Dr. Holinka. It is reasonable that the products allegedly used by Dr. Holinka were only chrysotile containing, a material that is not known

Lab Supply Defendants

-14-

July 18, 2007

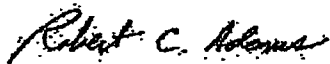
to have the potency for inducing mesothelioma, particularly at the exposure levels that would have been present in the laboratory environments in which he worked. Even at higher levels, the association of chrysotile to mesothelioma is weak. The 8-hour TWA concentrations and the lifetime cumulative exposures he had would be insignificant and irrelevant to the development of mesothelioma.

Further, it is my opinion that he had little or no exposure to asbestos from the brittle Bunsen burner pads due the asbestos undergoing thermal degradation because of the routine heating to elevated temperatures of greater than 900 °C. Asbestos present in the pad would be converted to other non-asbestos mineral forms, such as forsterite, that are not associated with a risk of mesothelioma development.

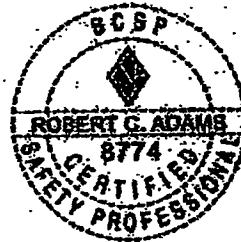
It is my opinion that there was no substantial asbestos exposure in Dr. Holinka's academic and professional career to explain the development of his pleural mesothelioma.

If you have any questions please do not hesitate to call me at (609) 243-9848.

Respectfully yours,



Robert C. Adams, MS, CIH, CSP
Senior Manager
ENVIRON International Corporation



Lab Supply Defendants

-15-

July 18, 2007

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Expert Report of Robert C. Adams

ENVIRON

Lab Supply Defendants

-16-

July 18, 2007

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Lab Supply Defendants

-2-

July 19, 2007

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ROBERT C. ADAMS, C.I.H., C.S.P.**Education**

- 1991 M.S., Safety Sciences, Indiana University of Pennsylvania
 1980 B.S., Biology, Clarion University of Pennsylvania

Registrations & Affiliations

Certified Industrial Hygienist (Certificate #5460) – American Board of Industrial Hygiene.
 Certified Safety Professional (Certificate #8774) – Board of Certified Safety Professionals.
 Asbestos Inspector and Project Designer – State of New York Department of Labor.
 Member ANSI A10.26 Subgroup – Emergency Procedures for Construction.
 Member Construction Health and Safety Committee of the American Industrial Hygiene Association.
 Vice Chair of the Emergency Preparedness Task Force of the American Industrial Hygiene Association.

Experience

Mr. Adams is a Manager at ENVIRON International Corporation in Princeton, NJ. He has 24 years of experience in the environmental health, and safety (EHS) field in both the public and private sectors. He has managed a wide range of projects including occupational health and safety risk and exposure assessments; indoor environmental quality evaluations, including assessments of mold and various air toxics; health and safety audits; emergency preparedness planning and managing multidisciplinary EHS teams in a crisis situation; field monitoring for air contaminants, noise, radiation, and temperature extremes; administrative programs and engineering control technology; litigation support and expert testimony; development of OSHA compliance programs for lead, silica, mercury, respiratory protection, noise and hearing conservation, laboratory safety, hazard communication, asbestos, polychlorinated biphenyls, radiation and others; and development and presentation of training programs on industrial hygiene methods, bloodborne pathogens, noise, hazard communication, respiratory protection, and Hazardous Waste Operations and Emergency Response.

Mr. Adams is also an Adjunct Professor at Saint Joseph's University in Philadelphia PA where he teaches industrial hygiene courses in the Masters program.

Professional Activities**Industrial Hygiene Risk and Exposure Assessment**

Nanotechnology Health and Safety Best Management Practices in Research and Development; Confidential Client; Bethesda, MD. On behalf of a client engaged in nanoparticle research and development, reviewed the available literature on nanotechnology and the health and safety hazards associated with these materials. Prepared a series of best practices guidelines for the client to implement across their business units that were engaged in research projects using nanomaterials. Prepared written guidance and presentation materials for the researchers to detail the prudent precautions that should be taken to reduce potential risks to the workers.

Assessment of Carbon Monoxide from Powered Industrial Trucks, Matrix Development Group, Elizabeth NJ. On behalf of Matrix Development Group, oversaw the investigation of elevated levels of carbon monoxide in a unit of a subdivided warehouse. Monitored ambient air conditions

ROBERT C. ADAMS, C.I.H., C.S.P.

2

in warehouse unit that significantly exceeded OSHA standards. It was determined that a malfunctioning powered industrial truck operating in the adjacent unit was creating significantly elevated concentrations of CO. In addition to maintenance of the truck, ENVIRON recommended improved sealing of the partition walls between the units to minimize CO migration. A subsequent follow-up investigation revealed that the CO levels in the unit had decreased to near background concentrations.

Air and Noise Monitoring and Engineering Control Survey for a Refractory, Confidential Client, Northeast, MD. Conducted noise monitoring of press operators at a major refractory to identify personnel exposed to elevated noise levels. Monitored silica exposures during various manufacturing processes. Developed engineering and administrative control recommendations to reduce noise, including acoustic barriers and enclosures. Provided performance specifications for the design of acoustic barriers and enclosures, including possible materials of construction. Developed engineering design specifications to reduce silica exposures, including local exhaust ventilation.

Indoor Environmental Quality and Fungal Contamination of a School, The French International School, Bethesda, MD. On behalf of the school, assessed indoor environmental quality investigations and fungal sampling conducted after water had damaged carpeting and pipe insulation. Provided an expert opinion on the quality and appropriateness of reports prepared by third-party consultants, conducted a visual surveillance of the school to identify the completeness of remediation efforts and the potential for additional water intrusion due to on-going deferred maintenance by the building owner. Identified problems associated with roof drains, unsealed penetrations of the exterior walls, poor drainage around the foundation wall and lack of swales to carry storm water away from the building. Prepared an expert report of short-term and long-term corrective actions to minimize future mold problems.

Exposure and Risk Assessment for Refinery Workers Handling Materials Contaminated with Asbestos, TOSCO, Trainer PA. On behalf of a refinery, conducted a review of potential exposures to workers handling materials suspected of being contaminated with asbestos. Conducted a review of exposure records, work activities and protective equipment used and compared to different risk levels, including OSHA and EPA Risk Assessment Guidelines. Based on exposure levels found, identified that worker exposures were below levels of concern based on the short duration of exposure and use of respiratory protection.

Removal of Mercury Contaminated Process Piping During Facility Decommissioning, Agere Systems, Allentown PA. On behalf of Agere Systems, monitored removal of process piping contaminated with mercury. Reviewed safety and health plans for work and clean-up protocols to be used. Conducted periodic monitoring of means and methods of removal and reviewed mercury monitoring results. Performed measurements of mercury levels in the piping to identify and segregate contaminated from non-contaminated piping.

Asbestos Abatement of Publicly-owned Buildings, NYC Department of Design and Construction, New York, NY. As Director of the NYC construction agency, was responsible for the oversight of numerous asbestos abatement projects required under NYC public law. Oversaw the preparation of bid specifications for removal, hired consultants to monitor abatement work and monitored contractor compliance with specifications and regulatory requirements.

ROBERT C. ADAMS, C.I.H., C.S.P.

Fungal Contamination of a Building Under Construction, The Security and Exchange Commission, Washington DC. On behalf of the SEC, assessed water intrusion sources during the construction of the new SEC headquarters building. Identified poor construction practices and logistics that were contributing to damaged porous building materials and growth of mold in wallboard, carpeting and insulation materials. Identified leaking roof drains, improper roof pitch allowing standing water, installation of interior finish materials before completion of the building envelope and potential foundation problems requiring corrective action.

Construction Worker Exposures to Silica, Reliance National Insurance, New York, NY. On behalf of an insurance company, conducted industrial hygiene surveillance of several work sites where construction employees were potentially exposed to silica from a variety of sources. Exposure assessment involved worker personal breathing zone sampling, collection of bulk samples of dust for silica content and assessment of various controls to reduce exposure.

Silica and Dust Exposure Monitoring In Concrete Bagging Operation, Confidential Client, Md. For a supplier of bagged concrete, evaluated worker exposures to silica and dust during bag filling operations. Worker exposures to silica were found to be three times the OSHA PEL. Provided client with recommendations for modifications to the dust collection system to improve capture of dust.

Ventilation System Evaluation and Design Modification, Confidential Client, Showell, MD. Conducted an evaluation and review of local exhaust system design for a large poultry-processing plant. Evaluation consisted of a review of design plans following the velocity pressure method and identification of system losses that required modification to achieve optimal airflow. Recommended design changes were developed to correct for system losses identified.

Industrial Hygiene Monitoring During Refinery Shutdown, Chevron, USA, Philadelphia, PA. To evaluate contractor worker exposures during a refinery shutdown, conducted exposure assessment sampling for benzene, total welding and metal fumes, total and respirable dust, silica and isocyanates to characterize potential exposures. Assisted the project manager with the overall project effort, including mobilization, staffing and general project oversight.

Industrial Hygiene Monitoring during the Excavation and Removal of Contaminated Soils, The Henderson Corporation, Eddystone, PA. In response to reported solvent odors during excavation work, conducted sampling for volatile organic compounds (VOCS) to identify suspect compounds and characterize potential exposures. Developed a health and safety plan (HASP) for specific phases of the project that would involve exposure to solvents in the contaminated soils, including confined space entry operations. Managed the industrial hygiene monitoring of the solvents during each phase with potential exposure and prepared final report on the effort.

Industrial Hygiene Monitoring During Refinery Shutdown, TOSCO Refining Company, Trainer, PA. To evaluate contractor worker exposures during a refinery shutdown, developed strategic plan for evaluating potential exposures, coordinated and oversaw industrial hygiene staff to carry out plan and conducted exposure assessment sampling. Evaluated exposures during confined space entry, including oxygen levels, lower explosive level, hydrogen sulfide, total petroleum hydrocarbons and carbon monoxide. Also evaluated benzene, total welding and metal fumes, total and respirable dust, silica, and noise to characterize potential exposures.

Wood Dust Exposure Assessment, Evaluation, and Control in a Furniture Manufacturing Plant, Pennsylvania House, Lewisburg, PA. Evaluated levels of hard wood dust created by the sanding

ROBERT C. ADAMS, C.I.H., C.S.P.

of furniture at various stages of manufacture. Initial exposure assessments identified operators of power sanders with the greatest risk of exposure, which was confirmed by air monitoring. Recommended methods to reduce exposures and provided follow-up evaluations on the effectiveness of controls.

Evaluation of Radiofrequency (RF) Radiation From Portable Di-Electric Heat Sealers, Confidential Clients, Various Locations in Pennsylvania. Responding to concerns about RF radiation using hand-held heat sealers, evaluated 10 different units used in two woodworking plants for personal exposure to RF radiation. To address overexposure posed by 7 of the 10 units studied, devised concept for improved copper shielding. Follow-up evaluation indicated that exposures were reduced on each unit that was retrofitted.

Formaldehyde Exposure Assessment, Evaluation, and Control in a Woodworking Plant, Confidential Client, Goodville, PA. Evaluated employee exposures to formaldehyde produced from spray finishing of wood products using formaldehyde-based lacquers. Study included employee exposure assessment, air monitoring, and control recommendations for ventilation systems to reduce airborne levels, and follow-up monitoring to confirm the effectiveness of controls.

Indoor Air Quality Investigation, MCI Telecommunications, Pittsburgh, PA and Fairfax, VA. Responded to several requests to evaluate the indoor air quality concerns at two multi-tenant office buildings. Investigated reports of employee illness and discomfort and correlated to observable building design, construction, and maintenance factors. Developed improvement recommendations and provided follow-up technical support through implementation.

Bioaerosol Investigation of a Multi-story Office Building, Confidential Client, Denver, CO. Assessed indoor and outdoor levels of bacteria and fungi on behalf of a building management company. Twenty samples were collected throughout a fifteen-story office building to assess levels and identify species. The building HVAC system was evaluated, and procedures for controlling bacteria and fungi in the heating and cooling system were reviewed. Results of testing indicated there was no amplification of bioaerosols inside the building.

Bioaerosol Investigation of an Office Building, Confidential Client, Wilmington, DE. On behalf of a bank, evaluated levels of bioaerosols inside a three-story office building. Fifteen samples were collected at various areas inside and outside the building to assess levels of bacteria and fungi. Also, samples of standing water inside the buildings air handling units were collected to determine the presence of Legionella species. Results indicated no amplification of bioaerosols levels was occurring in the building. No Legionella was found, although there was visible fungal growth in several air handling units. Corrective action recommendations were submitted.

Exposure Monitoring of Lead Exposure during Bridge Rehabilitation, Confidential Clients, Various Sites in Baltimore, MD. Conducted exposure evaluation and air sampling of several phases of bridge rehabilitation projects, including abrasive blasting, burning, cutting, and welding operations. Developed procedures to control worker exposures and investigated alternative control technologies for possible use in future projects.

ROBERT C. ADAMS, C.I.H., C.S.P.

Crisis Response

EHS Management during the World Trade Center Disaster. New York City Department of Design and Construction, New York, NY. As Director of Environmental Health and Safety (EHS) for the New York City Agency assigned to manage the clean-up of the World Trade Center disaster, was responsible for directing and coordinating environmental health and safety response for the private contractors hired by the City to remove debris and assist in rescue and recovery. On 10/29/2001 was placed in overall charge of site EHS programs. Responsibilities included organizing the response effort to minimize risks of injury and exposure to workers, overseeing preparation of, and revisions to, a site-wide EHS plan, preparing directives and guidance based on the site-wide EHS plan for distribution to the site workforce, serving as liaison with Federal, State and Local regulatory agencies and uniform services, coordinating the services of safety, health and environmental consultants and participating in numerous task forces. Oversaw an aggressive industrial hygiene monitoring program that evaluated hundreds of air contaminants, including asbestos, lead, mercury, VOCs, silica and mold. The results of this coordinated, multi-agency health and safety effort included no fatalities, no disabling injuries and a lost-time accident rate that was well below the construction industry average.

Security and Vulnerability Analysis of NYC Construction Agency. New York City Department of Design and Construction, New York, NY. As Director of EHS for this New York City Agency, participated in a task force to analyze the potential threats that might impact the agency and its operations. Assessed resources and developed recommendations for a comprehensive emergency response plan in the aftermath of the World Trade Center disaster. Provided strategic recommendations to the agency commissioner on establishing integrated emergency preparedness plans with other NYC agencies and the Office of Emergency Management. Assigned to represent the agency at the Emergency Operations Center upon activation in a crisis situation.

On-site Leader/Coordinator Training. Occupational Safety and Health Administration. Washington DC. Retained to assist with the training of Federal and State OSHA managers, including OSHA Specialized Response Team coordinators and staff assigned Regional Emergency Management Plan coordination responsibilities, who will be in on-site leadership and management positions during a nationally significant incident. Developed and led sessions on safety and health management activities after the World Trade Center collapse. Developed "lessons learned" examples and recommendations for improvements in emergency preparedness. Developed and led tabletop exercises on the use of individual and groups of technical specialists to aid decision making; development of control strategies; decision making in an emergency response (i.e., life saving) and recovery (i.e., life saving is not an issue) situations; risk assessment tools used on site both during emergency response and recovery; and finding alternative means to achieve safety goals.

Health and Safety Auditing

Health and Safety Assessment of a Shipyard; Confidential Client; Jacksonville FL
On behalf a private client in a merger and acquisition, conducted a health and safety review of the operations of a ship building and repair facility. Review included the assessment of OSHA requirements under 29 CFR 1915, assessment of industrial hygiene hazards, including risks from exposures to asbestos, lead, and toxic atmospheres, noise, compliance with personal protective equipment requirements, sanitation and general worker safety. The review included assessments of both shipboard operations and land side shops and facilities.

ROBERT C. ADAMS, C.I.H., C.S.P.

Compliance Assessment and Program Development, Vivendi Universal Entertainment, Hollywood, CA and Orlando, FL. As part of the acquisition of Vivendi Universal Entertainment (VUE) by GE/NBC, assisted VUE EHS management to meet OSHA compliance requirements at numerous locations. Managed a team that performed a comprehensive chemical inventory of the Universal Studios theme parks in Orlando, provided technical support on lock-out / tag-out, electrical safety, fire and life safety, fall protection, emergency action plans and confined space entry. Prepared written programs and assessed applicability of local regulations to VUE operations.

Health and Safety Audits of Quarry Operations, Genstar Stone Products Company, Various Locations, Md. As part of an insurance loss control service program, conducted audits of all of the Genstar operations in Maryland, including quarries, sand and gravel plants, a calcium carbonate plant, asphalt paving plants and ancillary operations. Assisted with the development of health and safety programs. Performed exposure monitoring for various chemical contaminants at several of the facilities. Assessed noise levels associated with quarry operations.

Management Program Audit of Health and Safety at a Pharmaceutical R&D Facility, Bristol - Myers Squibb Company, Lawrenceville, NJ. Participated in a multi-media compliance and management audit of environmental and occupational health and safety programs for a pharmaceutical research and development facility. Audited industrial hygiene, safety and radiological control programs. Conducted facility assessments and interviewed key management personnel. Recommendations were developed to address regulatory compliance, industrial hygiene and safety issues.

Environmental Due Diligence Assessment at a Particleboard Manufacturing Facility, Confidential Client, Bradford, PA. In conjunction with an environmental due diligence review on behalf of a buyer, conducted a baseline health and safety assessment of manufacturing operations at a particleboard and fiberboard manufacturing plant. Assessed compliance with OSHA regulations, evaluated safety and industrial hygiene hazards and provided recommendations to management on recordkeeping, improved hazard control and implementation of industrial hygiene monitoring programs.

Asbestos Policy Analysis, Volpe National Transportation Center (Federal Aviation Administration), Cambridge, MA. Conducted an analysis of asbestos exposure data from maintenance work on floor tile to develop a negative exposure determination for the Federal Aviation Administration. Co-authored several documents for the FAA analyzing the regulatory status of asbestos and co-authored draft revisions to existing FAA Orders pertaining to the safe handling of asbestos containing material during maintenance work.

Management Program Audit of Health and Safety at a Petroleum Research and Development (R&D) Facility, Mobil Research and Development, Paulsboro, NJ. Conducted a two-month audit of health and safety programs, and procedures in place at the Paulsboro Research Laboratory. Evaluated program support and direction, training, monitoring and inspection protocols, recordkeeping, and reviewed the safety and health procedures manual. Identified areas for program improvement and assisted with revisions and updates of programs and procedures.

Baseline Assessment of Health, Safety and Environmental Program for Research Laboratory, The National High Magnetic Field Laboratory, Tallahassee FL. Conducted an assessment of the NHMFL safety, health and environmental programs to identify hazards, controls and necessary programs. Management systems were evaluated and organizational staffing needs were

ROBERT C. ADAMS, C.I.H., C.S.P.

identified. Special safety health and environmental programs were evaluated including high power electrical systems, static magnetic fields, lasers, cryogens and radiation. Recommendations were developed to address regulatory compliance, safety management systems, training programs, safety organization and staffing, and content of a safety reference manual.

Independent Technical Review of Audit Programs, U.S. Department of Energy Uranium Mill Tailings Remedial Action Project, Multiple Sites. Participated in an independent technical review of the audit process conducted for the U.S. D.O.E. UMTRA sites. Responsible for reviewing the health and safety audit process, including an on-site observation of the conduct of the audit, interviews with auditors and review of the audit reports. Evaluated the audit operating procedures and provided recommendations for improving the effectiveness and efficiency of the program.

Management Program Audit of Industrial Hygiene Operations at a High-Technology Research and Development (R&D) Manufacturing Facility, International Business Machines, Manassas, VA. Led a team of three industrial hygienists conducting a comprehensive management audit of an industrial hygiene program at a large electronics R&D and manufacturing facility. Evaluated program support and direction, staffing, training, professional development, monitoring protocols, recordkeeping, and the industrial hygiene technical manual. Developed 20 management improvement recommendations, including implementation schedules with milestones and measures of success.

Technical Review and Quality Assurance Audits of Asbestos Survey Reports, Department of Veterans Affairs Medical Center, Coatesville, PA. Provided on-site technical assistance and quality control inspections of DVAMC facilities. Reviewed facility reports of asbestos building surveys to assure proper identification, assessment and evaluation of asbestos containing materials. Provided technical guidance to the project team during the final report writing stages, including the development of an operations and maintenance document.

Best Management Practices for Safety, Health and Environmental Programs, Department of Energy, Office of Energy Research, Washington DC. Participated in the development of a concept for a "Model Facility Safety Program" to be used by the DOE's Office of Energy Research. The goal of the effort was to review state of the art approaches to safety management and develop a plan for the implementation of the most practical and effective management of safety within DOE facilities. Key elements of the "Model" program were use of best management practices and integration of safety, health and environmental programs.

Health and Safety Program for an Electronic Equipment Manufacturer, Bear Automotive, Bangor, PA. As a result of corporate restructuring, a manufacturing facility required a review of its health and safety program. Led a team of three health and safety professionals in a management systems assessment and audit of the facility operations. Revised plant health and safety manual with significant modification to hazard communication, ergonomics, hearing conservation, and other OSHA-required programs. Facilitated the establishment of an ergonomics task force. Conducted ergonomics evaluations of workstation design. Conducted industrial hygiene exposure assessments of several processes and performed monitoring for noise and air contaminants. Assisted plant management in working with the OSHA area office by providing technical support and conducting an audit of OSHA recordkeeping.

ROBERT C. ADAMS, C.I.H., C.S.P.

Plantwide Health and Safety Audit of Manufacturing Plants, The Dial Corp., Multiple Locations. Conducted wall-to-wall industrial hygiene and safety audits of three plants manufacturing consumer products. Evaluated OSHA-required programs, including respiratory protection, hazard communication, and hearing conservation. Conducted employee exposure evaluations for chemical and noise stressors. Developed and verified the effectiveness of engineering and administrative control recommendations.

Health and Safety Audit of a R&D Laboratory, Congoleum Corporation, Trenton, NJ. Audited health and safety program and compliance with the OSHA laboratory safety standard for a R&D laboratory of a flooring manufacturer. Developed several management recommendations to improve the health and safety program, including development of a chemical hygiene plan. Follow-up audits indicated completion of all outstanding recommendations and improved compliance with OSHA regulations.

Expert Support

Asbestos Exposure to a Worker Handling Transite. Hoagland, Longo, Moran, Dunst, & Doukas, New Brunswick NJ. On behalf of a law firm representing a supplier of laboratory equipment, reviewed the case of a laboratory worker employed by a metal fabrication company that alleged that his mesothelioma was the result of handling and cutting Transite materials that were allegedly supplied by the defendant. Reviewed the issues in the case, developed exposure factors, and estimated the likely exposure that would have resulted from the cutting of the Transite. Exposure estimates showed that the plaintiff had very limited exposure to asbestos and that the exposure would have been insignificant compared to other exposures that the plaintiff had in the course of employment in the metal shop, which included handling of loose asbestos materials.

Asbestos Exposure Assessment for a Construction Worker Handling Drywall and Joint Compounds, Hoagland, Longo, Moran, Dunst, & Doukas, New Brunswick NJ. On behalf of a law firm representing a building materials supplier, reviewed the case of a construction worker that claimed that his fatal mesothelioma was the result of the handling of products supplied by the defendant building materials supplier. Reviewed the scientific literature and developed exposure estimates to show that the worker had exposures to asbestos materials as a result of the demolition of previously installed materials that were significantly greater than the exposures that would have been created from the use of the building materials that were supplied by the defendant.

Asbestos Exposure Risk Assessment, Confidential Client, Frenchtown, NJ. On behalf of a law firm representing a manufacturer, assessed residual asbestos exposures in the aftermath of a fire at a manufacturer of industrial compressed gases. Assessed various data collected by clean-up contractors and consultants, oversaw field clean-up and collected bulk samples of suspected asbestos-containing material in the surrounding community. Prepared a risk assessment report that was presented to several regulatory agencies to obtain a "No Further Action" classification.

Worker Exposure to MITC-FUME Used in the Treatment of Utility Poles; Cornell Foley; Rosedale NJ. On behalf of a law firm representing the manufacturer of a fungicide called MITC FUME (Methyl Isothiocyanate), reviewed the case of a utility lineman/troubleshooter that alleged his exposure to MITC-FUME from a damaged utility pole was the source of his recurring arm pain. Reviewed the information in the case to determine if the manufacturer had met all regulatory obligations related to registering the product, labeling, material safety data sheets and providing appropriate hazard warnings to the users of the product. Prepared an expert report that showed that the manufacturer had met all regulatory requirements for the product and identified

ROBERT C. ADAMS, C.I.H., C.S.P.

discrepancies related to the alleged exposure that suggested that the injury was not related to the MITC-FUME.

Construction Worker Accident during Bridge Deleading; Confidential Client; New York, NY. On behalf of a law firm representing a plaintiff injured while working on a bridge deleading project, provided regulatory assistance to counsel related to NYC labor law and New York State Industrial Code Rules applicable at the time of the injury.

Silica Exposures at an Abrasives Manufacturer, Confidential Client, Hasbrouck Heights, NJ. On behalf of a law firm representing a manufacturer, provided independent third party review of industrial hygiene monitoring for silica conducted by OSHA. At issue was an alleged exposure to workers in the packaging operation from silica above the OSHA permissible exposure limit resulting in citation. Reviewed OSHA citation and conducted follow-up monitoring. Provided technical assistance to counsel during OSHA informal conference. As a result of rechecking OSHA data, identified error in calculation of time weighted average, which resulted in withdrawal of citation.

Respiratory Illness Case, Confidential Client, Wheeling, WV. Conducted a field investigation of ammonia exposures in a food processing plant to assist in evaluating the work-relatedness of an alleged non-specific respiratory disorder claim. Monitored worst case exposure conditions throughout plant and prepared industrial hygiene opinion of the probability of work-relatedness based on exposure data and chemical toxicity data.

Occupational Leukemia Case, Confidential Client, New York. On behalf of a law firm representing a chemical manufacturer, reviewed ten years of industrial hygiene data related to employee exposure to formaldehyde in a can manufacturing plant. Assessed the monitoring methodologies, analytical methods and exposure data to develop an exposure profile and prepare an opinion of the probability of concentrations of formaldehyde in excess of historic and current exposure limits.

Microbiological Contamination of a Residential Home, Confidential Client, St. Petersburg, FL. On behalf of a law firm representing a mortgage company, provided indoor air quality investigation of bioaerosol contamination of a home to establish contamination levels and identify potential sources. Conducted five days of bioaerosol monitoring and collected bulk samples of potentially contaminated building materials. Completed a thorough inspection of the home and identified multiple sources. Reviewed previous monitoring conducted by consultant retained by homeowners and provided opinion on the appropriateness of the methodologies used and the conclusions drawn. Assisted counsel in preparing questions for deposition of consultant.

Lead Exposures at a Printing Operation, Confidential Client, Maywood, NJ. On behalf of a law firm representing a manufacturer, provided independent third party review of industrial hygiene monitoring for lead being conducted by OSHA and another consulting industrial hygienist. Issue was alleged exposure of workers in a linotype remelt operation to lead above the OSHA permissible exposure limit. Reviewed OSHA and consultant reports and observed follow-up monitoring. Provided technical assistance to counsel during OSHA closing conference.

Program Audit of Health and Safety at a Pharmaceutical Manufacturing Facility, Confidential Client, Bronx, NY. On behalf of a law firm, conducted a health and safety compliance review of operations at a pharmaceutical manufacturing plant. Audit focused on manufacturing and laboratory processes and procedures, including chemical handling, use and storage, quality

ROBERT C. ADAMS, C.I.H., C.S.P.

10

assurance test protocols, ventilation system effectiveness, safety programs and hazard communication.

Occupational Asthma Case, Crawford & Co., Cleveland, OH. On behalf of the claims department of a third party administrator, reviewed exposure data and chemical information concerning an alleged case of occupational asthma. Provided an industrial hygiene opinion on the probability of work-relatedness of the case based on available exposure and toxicity information.

Compliance And Training Programs

Analysis of Beryllium Exposure Metrics, Occupational Safety and Health Administration, Washington, DC. Conducted a review of published literature related to various methods of evaluating workplace exposures to beryllium and assessed possible new exposure metrics which the agency might use for the promulgation of a new exposure limit. Prepared a report to be submitted as required under the Small Business Regulator Flexibility Act.

Health and Safety Compliance Manual Development, The New Yorker Hotel, New York NY. Developed a comprehensive health and safety manual for a large hotel complex, including all written programs, training materials and reporting forms to assist client meet OSHA requirements. Also provided various support to the hotel and its legal counsel during negotiations with OSHA regarding issued citations.

OSHA Compliance Program, United States Postal Service, Various locations in New York and New Jersey. Developed and presented a multi-media training program on OSHA compliance requirements to nearly 1000 USPS managers and supervisors as a result of the Postal Employees Safety Enhancement Act of 1998, which placed the USPS under federal OSHA jurisdiction.

Training Program Development for a Clinical Laboratory, Smith-Kline Beecham, King of Prussia, PA. Developed four train-the-trainer modules to facilitate OSHA compliance for a pharmaceutical clinical laboratory facility. Developed training programs for hazard communication, respiratory protection, hearing conservation, universal precautions and personal protective equipment (PPE). Developed lesson plans, trainer outlines, and visuals to be used by management personnel. Programs were tailored to address the client's corporate policies and procedures for both domestic and international operations.

Confined Space Entry Program for Corporate Health and Safety Management, Consolidated Rail Corporation, Philadelphia, PA. Developed a corporate program for Conrail, a major freight railroad, to comply with the OSHA confined space entry standard. Program included management policies, compliance procedures, decision-making flow charts, terms, and definitions.

Ergonomics Evaluations and Program Development for a Garment Manufacturer, Londontown Corporation, Baltimore, MD. Conducted initial evaluations of ergonomic exposures in five cut and sew plants and a distribution center. Developed and delivered ergonomics training to engineering and supervisory staff. Assisted Corporate Safety and Health Manager develop an ergonomics program manual.

ROBERT C. ADAMS, C.I.H., C.S.P.

Indoor Air Quality Training Program, PECO Energy, Philadelphia, PA. Developed and conducted a client-specific, eight-hour, indoor air quality training program for PECO Energy, a major southeastern Pennsylvania utility.

HAZWOPER Training, The Dial Corp., Various Locations in the United States. Developed a client-specific training program for operations-level emergency responders and presented the program at six manufacturing sites. The program was designed to comply with the training requirements of OSHA Regulation 1910.120 while addressing the unique needs of the facility operations.

Prior to joining ENVIRON, Mr. Adams held the following positions:

- Director – Environmental Health and Safety Services Bureau, City of New York Department of Design and Construction, Long Island City, NY
- Division Manager – ATC Associates, Inc., New York, NY
- Vice President – The Darien Group, Glen Mills, PA
- Senior Industrial Hygienist – Golder Associates, Mount Laurel, NJ
- Section Manager – Roy F. Weston, Inc., West Chester, PA.
- Industrial Hygienist – Crawford & Company, Broomall, PA.
- Senior Industrial Hygienist – Liberty Mutual Insurance Company, Mechanicsburg, PA.

HONORS AND RECOGNITIONS

- NYC Department of Design and Construction Commissioner's Award – April 2001
- A&E Biography/New York Mayor's Office Community Hero Award – June 2002
- Liberty Mutual Insurance Company Vice Presidents Safety Award – June 2002
- Greater New York Construction Users Council – Special Recognition for Safety Achievement in a Crisis Situation – November 2002
- Fellow of the American Industrial Hygiene Association – March 2006

PUBLICATIONS

Garvey, D., Adams, R. 2005. Chapter 6. Post Construction Phase in *Health and Safety Requirements in Construction Contract Documents*. American Industrial Hygiene Association. Fairfax VA.

ROBERT C. ADAMS, C.I.H., C.S.P.

Adams, R. 2006. Chapter 5 Communication/Coordination in *The Role of the Industrial Hygienist in a Pandemic*. American Industrial Hygiene Association. Fairfax VA.

PRESENTATIONS

Adams, R. 2007. From Uncertainty to Practice - What Nanomaterials Users Should be doing Today to Prepare for Tomorrow. Presented on behalf of the Society for the Advancement of Materials and Process Engineering. Baltimore, MD.

Adams, R. 2006. Fundamentals of Nanotechnology. Presented on behalf of the New Jersey chapter of the American Industrial Hygiene Association. New Brunswick, NJ.

Adams, R., Campbell R. 2006. Dirty Dirt: Impact on Indoor Air and Brownfields Redevelopment. Presented at OSHA for Real Estate Developers and Managers seminar, Montclair State University, Montclair NJ.

Adams, R. 2006. Nanotechnology – The Implications for Occupational and Environmental Health and Safety. Presented on behalf of the New England chapter of the American Industrial Hygiene Association. Boston, MA.

Adams, R. 2006. Implications of Nanotechnology for Workplace Safety. Presented on behalf of the Society for the Advancement of Materials and Process Engineering. Dallas, TX.

Adams, R. 2006. Nanotechnology 2006 – An Update on the Implications for the Safety Health and Environmental Profession; Audio conference presented on behalf of the American Society of Safety Engineers. Des Plaines, IL.

Adams, R. 2006. Protecting Disaster Workers: The Lessons of the World Trade Center Response. Presented on behalf of the Lehigh Valley Local Section of the American Industrial Hygiene Association Annual Conference. Bethlehem, PA.

Adams, R. 2005. Nanotechnology – Implications for the Safety Health and Environmental Professional; Audio conference presented on behalf of the American Society of Safety Engineers. Des Plaines, IL.

Adams, R. 2005. Atmospheric hazards from the collapse of the World Trade Center – Presented on behalf of the Florida Chamber of Commerce – Environmental Permitting School. Marco Island, FL.

Adams, R. 2005. Protecting Disaster Workers: Lessons Learned from the World Trade Center. Presented at the American Industrial Hygiene Conference and Exposition. Anaheim, CA.

Adams, R. 2004. Understanding Silicosis. Presented at the New Jersey Institute for Legal Education. New Brunswick, NJ.

Adams, R. K. DeLeo. 2004. Dirty Dirt: Is it Construction or is it Hazardous Waste? Presented at the American Industrial Hygiene Conference and Exposition. Atlanta, GA.

Adams, R. 2002. WTC: EHS Success Stories. Presented at the Northeast Regional Industrial Hygiene Conference. Princeton, NJ.

ROBERT C. ADAMS, C.I.H., C.S.P.

13

- Adams, R. 2002. WTC: Environmental, Health and Safety Challenges at a Disaster Site. Presented at the Fall Technical Conference of the American Industrial Hygiene Association and the American Society of Safety Engineers. Denver, CO.
- Adams, R. 2002. WTC: Environmental, Health and Safety Challenges during Recovery and Clean-up. Presented at the Air and Waste Management Association Annual Conference and Exhibition. Baltimore, MD.
- Adams, R. 2002. WTC: Environmental, Health and Safety Challenges during Recovery and Clean-up Phases. Presented at the American Industrial Hygiene Conference and Exposition. San Diego, CA.
- Adams, R. 2002. WTC: Environmental, Health and Safety Challenges during Rescue Phase. Presented at the American Industrial Hygiene Conference and Exposition. San Diego, CA.
- Adams, R., Glass, J. 2002. Professional Development Seminar: Construction Health and Safety Current Topics. Presented at the American Industrial Hygiene Conference and Exposition. San Diego, CA.
- Adams, R. 2002. WTC: Environmental, Health and Safety Challenges. Presented at the New York Interagency Engineering Council Annual Conference. New York, NY.
- Adams, R. 2002. Managing EHS in a Disaster: Safety and Health Challenges from 9/11. Presented at the Safety Executives of New York Annual Professional Development Conference. Briarcliff Manor, NY.
- Adams, R. 2002. World Trade Center Recovery and Safety Issues. Presented to the Municipal Engineers of the City of New York. New York, NY.
- Adams, R. 2001. Ground Zero: Environmental Issues in New York City after 9/11. Presented at the Society of Women Environmental Professionals of Greater Philadelphia Annual Conference. Philadelphia, PA.
- Adams, R. 2001. Ground Zero: Lessons Learned. Presented at the Northeast Regional Industrial Hygiene Conference. Princeton, NJ.
- Adams, R., Garvey, D., Drysdale, D. 2000. Professional Development Seminar: Industrial Hygiene in the Construction Environment. Presented at the American Industrial Hygiene Conference and Exposition. Orlando, FL.
- Adams, R. 1999. Construction Safety and Health. Presented at the Northeast Regional Industrial Hygiene Conference. Princeton, NJ.
- Adams, R. 1996 – 2003. Industrial Hygiene Sampling and Analytical Methods. Presented on behalf of the New Jersey Section of the American Industrial Hygiene Association. Cook College. New Brunswick, NJ.
- Adams, R. 1994. Office Ergonomics. Presented to the Building Owners and Managers Association. Edison, NJ.

ROBERT C. ADAMS, C.I.H., C.S.P.

14

Adams, R., D.L. Jones. 1994. Developing a Strategy for Injury Prevention: A Team Approach. Presented at the Industrial Hygiene and Occupational Medicine Seminar. Penn State University. Malvern, PA

Adams, R., R. Donze. 1994. A Common Sense Approach to Personal Protective Equipment: The Amended OSHA PPE Regulations. Presented at the Industrial Hygiene and Occupational Medicine Seminar. Penn State University. Malvern, PA.

Adams, R. 1994. Residential Indoor Air Quality: Impact on Asthmatics. Presented to the Chester County Chapter of the American Lung Association. Paoli, PA.

Adams, R. 1983. Occupational Health and Safety in Batch Plant Operations. Presented to the Maryland Asphalt Paving Association. Baltimore, MD.